Security Controls Hurt Research, NAS Warns

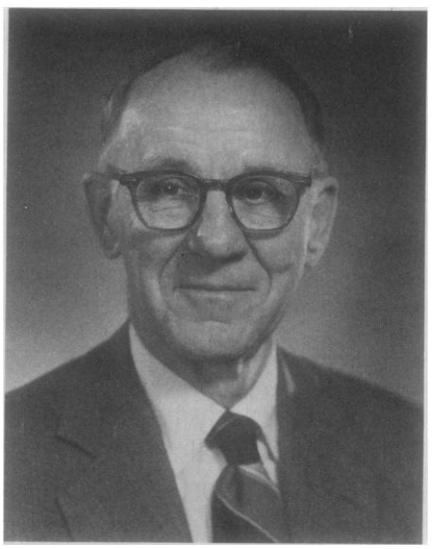
A panel of the National Academy of Sciences has said that efforts to restrict open communication are counterproductive

A committee of the National Academy of Sciences (NAS) has said that it has failed to find evidence that leaks of technical information from universities or other research centers have damaged the national security. The panel, which conducted a 6-month intensive study of the conflicts between open scientific communication and national security, has come down firmly on the side of unfettered research and communication.

The panel was formed last March,* following discussions between NAS members and officials at the Department of Defense (DOD). Then, as now, research scientists were expressing grave concern that the DOD was going overboard in its attempts to prevent leaks of technological information to the Soviets. The DOD, however, is concerned that the Soviets' military buildup is being fueled by their acquisition of Western technology, including scientific data that are published and discussed at meetings. So the NAS panel was asked to examine the costs and benefits of open scientific communications. The panel chairman was Dale Corson, president emeritus of Cornell University, and its 18 other members included university administrators, corporation executives, a former director of the National Security Agency, and a former under secretary for research and engineering at DOD.

One difficulty in determining the seriousness of the technology transfer problem is that most of the information is classified. The NAS panel members felt that it was so important that they assess the nature of this classified information that they all obtained security clearances and had three secret-level briefings by members of the intelligence community. Six of the panel members already were cleared at the highest level. These members had, in addition, several top secret briefings.

This classified information convinced the panel members that technology transfer is a real and serious concern. But, they noted, it is difficult to gauge how that leakage has affected national security. The problem is that it is nearly impossible to come up with audit trails—to trace the leak of specific technical information through to its use in a military context. "Such a retrospective analysis would prove difficult enough if it were undertaken for ordinary domestic technology transfer, where all the principals in a transfer could be interviewed; meaningful analyses of international transfers, some involving extra legal means, are even more difficult. For the present, we are left with some indirect indicators and some individual case studies," the panel wrote.



Dale Corson

There is ample evidence, apparently, that the Soviets mount an intense effort to gain Western technology. There also is good evidence of technology being lost to the Soviets. But, said the panel "evidence on the military significance of identified transfers is largely fragmentary."

Despite these difficulties in describing the technology transfer process, the panel came away with definite impressions about university research. There are very few documented instances of technology losses through academic channels and those few cases involved Eastern bloc scientists who abused their visits to the U.S. Thus open university research is most likely not a major threat. Says Corson, "On the basis of all the information presented, the panel concluded that open scientific communication involving the research community does not present a material danger from near term military applications."

The danger of clamping down on academic research, said the panel, is that universities are where the next generation of scientists are trained. If research in universities is hindered, irreparable harm may be done to the national supply of scientists. Furthermore, universities, unlike industries and the government, are not set up to control the flow of information. It often is infeasible to think of prohibiting foreign visitors from hearing lectures or visiting university laboratories, for example.

In addition, the military applications, if any, of most university research are far

Criteria for Controls

In general, said the NAS panel, there should be no restrictions whatever on government-supported university research. But in those "gray areas" where classification is undesirable and yet some controls are warranted, government agencies should ask whether four criteria are met. Only if all of them are met should controls be considered. The criteria are

- The technology is developing rapidly and the time of transfer from basic science to application is short.
- The technology has identifiable direct military applications; or it is dual-use and involves processes or production-related techniques.
- Transfer of the technology would give the U.S.S.R. a significant near-term military benefit.
- The U.S. is the only source of information about the technology, or other friendly nations that could also be the source have control systems as tight as ours.—G.K.

*Financial support for the study was provided by the Department of Defense, the National Science Foundation, the American Association for the Advancement of Science, the American Chemical Society, the American Geophysical Union, and the National Academy of Sciences.

0036-8075/82/1015-0271$01.00/0

off and hard to predict. Thus, said the panel, "the vast majority of university research programs, whether basic or applied, should be subject to no limitations on access or communications." Research whose military applications are clear and whose secrecy is paramount should be classified.

But, said the panel, there are a few "gray areas" of research that have military significance yet should not be classified. If they were to be classified, universities would drop out of the programs and it is important that universities remain involved in these research areas. The field of microelectronics contains some of these gray areas, according to the panel.

In the rare cases where controls short of classification are desirable, the NAS panel suggests a system similar to the voluntary prepublication review that many cryptology investigators have agreed to. "One of the main features of our concern is to set the rules ahead of time," Corson says. The panel recommends that the government spell out in its contracts that researchers are expected to submit their papers to the contracting agency at the same time as they submit them to journals for publication. The federal agency would then have 60 days to comment on the manuscripts and suggest modifications. If the researchers refuse to modify their papers, the government would have the ultimate right to classify the work or cancel the contract. In addition, foreign nationals from certain countries—presumably the Soviet Union and Eastern bloc nations—would be prohibited from working on these research projects. But universities would not be expected to keep these foreign visitors out of classrooms, laboratories, or seminars.

The reason for these recommendations for controls on gray areas of research, says Corson, is that it is not the results per se but the know-how that Soviet visitors often seek. To get that know-how, they would have to work for months with their American hosts, side by side in the laboratory. "We are now being asked not to show them [the Soviets] our laboratories. We don't like that. But they cannot come and have government support to work in the labs for 6 months or a year," Corson says.

As for the systems now used to control the flow of technology to the Soviets, the panel found much room for improvement. There are overlapping and confusing regulations administered by the departments of Defense and Commerce whose implementations are far from clear. "The panel discovered, not surprisingly, that few people either inside or out of the government have a comprehensive understanding of the government's technology control effort," says Corson.

One of the first things that could be done to improve the current control system would be to streamline the Militarily Critical Technologies List, according to the panel. This is a 700-page list of technologies whose export the DOD attempts to control. The list is so enormous, says Corson, that "it is hard to imagine things not on the list. For example, high vacuum technology is on the unclassified part of the list. What is the purpose of that? There is hardly a research lab in the world that doesn't do high vacuum technology."

Technology transfer is a real and serious problem.

Another difficulty with the current control system is that there is a serious shortage of people who can assess which research should be controlled and which should not. "Wherever we turned, the agencies were short-handed and lacked people who were competent in depth in technical areas," Corson remarks. This personnel shortage is particularly significant in the processing of visa applications. At present, Corson notes, the government "can make judgments in only a small percentage of cases. If a Russian engineer wants to work in a particular field, [the visa processors] are not competent to decide whether the area is important or not important, whether the visitor can go anywhere or whether he should be restricted." The panel recommends that "serious consideration be given to increased staffing."

Now that the NAS panel has released its report, the next step is for the government to decide how to act on it. One question is whether the White House, through the Office of Science and Technology Policy, will play a role in implementing the panel's recommendations. "The question is whether the policy issue is of sufficient concern to elevate it to the White House level," Corson remarks. "I think it is. I think the problems are understood better at the OSTP level than anywhere else in government." The NAS panel has already briefed the intelligence community and the departments of State and Commerce on its recommendations.—GINA KOLATA

Scientists Meet with Pope on Nuclear War Danger

An international gathering of 57 scientists, including top officials of academies of sciences from East and West, on 24 September presented Pope John Paul II with a declaration on the prevention of nuclear war condemning nuclear weapons and the arms race.

U.S. National Academy of Sciences (NAS) president Frank Press was among scientists from Western, socialist, and Third World countries who signed the statement. They urged major powers to take a number of specific actions—notably foregoing the first use of nuclear arms—toward achieving the "ultimate goal of complete nuclear disarmament."

The meeting was held in the Vatican under the auspices of the Pontifical Academy of Sciences. John Paul encouraged the development of the statement in the latest of several instances of interaction with scientists on the issue since he established a permanent study group on the consequences of nuclear war in 1980 (*Science*, 26 February, p. 1076). The Pope visited the meeting to receive the declaration.

The declaration cites an unprecedented threat "arising from the massive and competitive accumulation of nuclear weapons," and warns that a major war could result in the "immediate deaths of hundreds of millions of people," and "trigger major and irreversible ecological and genetic changes, whose limits cannot be predicted."

Perceptions that the threat of nuclear war is increasing have prompted several efforts among scientists to muster an organized response. The recent declaration in Rome represented the confluence of two such efforts. The Pontifical Academy under its president, Carlos Chagas of Brazil, had worked independently on a statement on the immorality of nuclear war. In the United States, discussions of an international initiative on the topic were begun within NAS by its former president, the late Philip Handler, and then foreign secretary Thomas F. Malone, and was endorsed by Press when he assumed the presidency last summer. Talks with University of No-